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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE.



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DECEMBER 30, 1933

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See Page 426

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DO YOU KNOW?

A model floating airdrome for sea landings is being experimentally tested in Maryland.

Milk that has frozen does not become less nutritious, it appears from recent experiments.

Spain is planning a huge irrigation scheme which will bring 1,500,000 acres of land under cultivation.

The idea that "the greater number of eggs a hen lays the poorer the quality of the eggs" is not upheld by tests.

Grapes grown in the western United States usually have a higher sugar and solids content than those grown in eastern states.

Tusks of a male African elephant usually weigh about 40 pounds each, but record-breaking tusks weigh over two hundred pounds apiece.

An ink made with ammonia instead of acid has been developed at the Bureau of Standards and is said to have practically no deteriorating effect on paper.

Popcorn pops best when moist, says an agricultural experiment station official.

The daughters of the Greek god of medicine Aesculapius were named Hygeia and Panacea.

New Hampshire now has a bridge for cows, a concrete over-pass enabling cows to cross a busy highway safely.

Indians of both eastern America and the Southwest cultivated the sunflower for its seeds, which were ground into meal.

Columbia sheep, a new type developed by government scientists in Idaho, produce heavier fleeces than any breed commonly raised in range areas.

It was in the beginning of the nineteenth century that pharmacists began to isolate the active constituents from crude herbs and plant products.

The University of Michigan Herbarium has been collecting botanical specimens for 95 years, and now has over 220,000 examples of plant life.

WITH THE SCIENCES THIS WEEK

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ARCHAEOLOGY

Where were thousand-year-old fingerprints found? p. 420. *Ancient Life in the American Southwest*—Edgar Lee Hewett—Bobbs-Merrill, 1930, \$5.

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BIOLOGY

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Why does the geranium get along so well in the house? p. 427.

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Why is "diplogen" suggested as a name for heavy hydrogen? p. 425.

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How do pituitary hormones regulate the sex glands? p. 421. *The Tides of Life*—R. G. Hoskins—Norton, 1933, \$3.50.

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When did the Chinese use individual drinking cups? p. 426. *Boys' Book of Exploration*—J. Harris Gable, Dutton, 1930, \$5.

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Where does immunity to germs affect an animal? p. 424.

NAVIGATION

What device reveals the horizon more clearly to the navigator? p. 422.

PHYSICS

What is the velocity of light? p. 419. *Measurement of the Velocity of Light Between Mt. Wilson and Mt. San Antonio* (Contributions from Mt. Wilson Obs., No. 329)—A. A. Michelson—Carnegie Inst. of Washington, 1927, 25c.

Where has new proof of the Raman effect been found? p. 425.

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What happens in Mme. Bori's throat when a bad note is produced? p. 423.

PHYSIOLOGY

What is chymo-trypsin? p. 420. *The Human Mechanism*—Hough, Sedgwick and Waddell—Ginn, 1929, \$3.

SOCIOLOGY

Is the modern world warlike? p. 419.

ZOOLOGY

What is "suppression breeding"? p. 423.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but are references for further reading. Books cited can be supplied by Book Dept., Science News Letter, at publishers' prices, prepaid in the United States.

PHYSICS

Variations in Light Speed Not Accepted by Scientists

**Dr. Adams Holds Variation Conceivable Only as Last Resort
And Not Established by Results of Recent Experiments**

Variations in the speed of light are not accepted by Carnegie Institution scientists, on the basis of recently announced results. The discrepancies in the instrumental readings must find their explanations elsewhere. Dr. Walter S. Adams, director of the Mount Wilson Observatory, where the late Prof. A. A. Michelson prepared the latest light-velocity experiments, indicated this in an exclusive statement to Science Service.

"The last hypothesis to be adopted is that the velocity of light varies," said Dr. Adams. "If a man knows accurately when the sun should set but observes that according to his watch it sets five minutes ahead of time, a logical person does not assume that the motion of the sun varies but that his watch is wrong."

By **DR. WALTER S. ADAMS**, Director, Mount Wilson Observatory

THE LATEST average value of the velocity of light, which will doubtless be accepted as the world standard, is announced by the scientists of the Mount Wilson Observatory of the Carnegie Institution of Washington as 299,774 kilometers (186,276 miles) per second. Further analysis of the observations may change the last figure by one or two units. This value compares with the Michelson 1926 result of 299,796 kilometers per second obtained as the result of observing the passage of light between two mountain peaks in California. The new value is 22 kilometers per second (or seven thousandths of one per cent.) lower than the old value.

Certain unexplained variations which exceed considerably the experimental error of measurement have been found in the course of the observations. One of these had for a time a period of $14\frac{3}{4}$ days and another a long period of about one year, but neither period persisted throughout the entire series. The range of variation in each case was about 20 kilometers (12 miles) per second.

The cause of such apparent variations is first of all to be sought in instrumental sources, in possible changes in the

apparatus, the length of the light-path, ground disturbances, errors in the timing mechanism or a possible effect of refractive index in the path of light. The precision required in this difficult experiment is extraordinarily high. It is only as a last resort that we should have recourse to the hypothesis that the velocity of light actually varies. We have long believed this to be a fundamental constant of nature and although a variation is conceivable it is not established by these results.

The present investigation was carried on by Dr. Francis G. Pease of the Mount Wilson Observatory and Fred Pearson of the University of Chicago, working with the mile-long vacuum pipe line at the Irvine Ranch, Santa Ana, California. The apparatus was designed and first used by the late Prof. A. A. Michelson. Although yielding a value for the velocity of light of extraordinarily high accuracy it can hardly settle questions involving quantities of such a minute order as those here considered. For such an investigation it would be desirable to have quartz mirrors, a much more stable pipe-line and

SOCIOLOGY

More War in World As Civilization Advances

WAR HAS been growing more and more common, not less, as the world has grown older and civilization has (presumably) advanced.

This discouraging but fact-facing conclusion was laid before the meeting of the American Association for the Advancement of Science, by Prof. Pitirim A. Sorokin and Lieut.-Gen. N. N. Golovin of the Harvard University department of sociology.

The two men tried to get a quantitative expression of the warlikeness of the world in each century from the twelfth



MEASURED LIGHT

The mile-long vacuum tube used in the Michelson velocity of light experiment at Santa Ana, Calif., is shown above. The inset pictures the 32-sided rotating mirror which flashed light into the tube.

elaborate timing devices.

Recent determinations of the velocity of light have shown a tendency toward slightly smaller values. It does not seem necessary, however, to ascribe this to other than coincidence, especially since many of the individual values in the different series of observations frequently overlap another widely.

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onward, for Central Europe, England, France and Russia; and from the sixteenth century onward they added the Netherlands, Spain, Italy and Germany. Admitting from the outset that their results could be only rough preliminary approximations, they assigned numerical values to such factors as size of armies, proportion of losses, numbers of nations involved and duration of the conflicts. Statistically manipulated, these figures yielded "index numbers" for the many wars the world has seen through the centuries. (Turn Page)

The grand total of these index numbers, for all eight nations studied, shows a progressive increase from the twelfth century, when the number was 2.7, doubling or more than doubling for each century until the seventeenth, when it had risen to 519.4. The eighteenth century, with an index number of 367.5, showed little increase, and during the nineteenth century the number actually fell to 318.9. But the twentieth century, with the World War and its smaller forerunners involving scores of nations, tens of millions of soldiers and millions of deaths, raised the index number to the appalling level of 13,736.0.

Dr. Sorokin and Gen. Golovin regard all wars before the seventeenth century as "comparatively insignificant"; but since that time things have become progressively worse. Even the nineteenth century, with its recession

from the preceding high points of the seventeenth and eighteenth centuries, was more than a hundred times worse than the "barbarous" Middle Ages so far as war was concerned.

"This refutes the theories," they commented, "that war tends to disappear with the progress of civilization. It means also that the commendable hopes that war will disappear in the near future are based on nothing more than wishes and a belief in miracles."

The two investigators could find no marked trend, cycle or periodicity in the occurrence of European wars, though there was some indication of such periodicity in three countries: Germany, Italy, and Russia. In all probability, they suggested, this "trendless" or erratic oscillation in the occurrence and intensity of war will continue indefinitely.

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ARCHAEOLOGY

95-Room House Unearthed In Lost City by CCC Workers

By M. R. HARRINGTON, of the Southwest Museum, in charge of the Lost City Project

CIVILIAN Conservation Corps boys, excavating ruins of the Lost City of the Moapa Valley which will soon be flooded by waters of Boulder Dam, have uncovered an ancient ruined building containing 95 rooms. It seems to have been the largest building in the Lost City, and is probably the largest structure of the Early Pueblo Period known. Its age is estimated at 1,200 to 1,500 years.

Most of the 95 rooms were small, some too small for a human being to live in. These latter were doubtless for storage. The larger rooms, many provided with fireplaces, were living rooms.

Strangely enough, the rambling, one-story structure had been three times destroyed and twice rebuilt. This is shown by three layers of ruined rooms, piled one above the other. Some time after the final rebuilding the occupants left for good. The roofs fell in and the adobe walls crumbled. Desert winds piled drift sand into a large sand dune over the spot.

To uncover the ruins, the CCC boys had to remove not only six feet or so of sand but thick growth of thorny mes-

quite bushes. (A worker is pictured on the opposite page.) None of the walls stands higher than three or four feet. They are of adobe clay or adobe with layers of stone between.

Finger marks which have remained in the adobe more than a thousand years were found. These were inprinted when some builder who must have been in a hurry laid on a course before the last one was dry. The adobe was squeezed out of shape by the weight above, and had to be pushed back with the fingers.

The excavators have found many articles, lost or abandoned when the inhabitants left their homes for the last time. Largest of these are metates, or grinding slabs for corn, and manos or hand-stones used with them. The smallest articles are grains of charred corn and tiny beads of shell. There are bushels of broken pottery, some with painted designs in black and white or black and red. An occasional jar or bowl is whole or restorable.

Among the most curious things found were a number of crude clay dolls, all broken. Most of them were in one place, in the main patio. Is it a question whether these were children's toys or were used in some ceremony.

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PHYSIOLOGY

New Protein-Digesting Enzyme Found in Pancreas

DISCOVERY of a powerful protein-digesting enzyme in the pancreas has just been announced by Drs. M. Kunitz and John H. Northrop of the Rockefeller Institute Laboratories in a report to *Science*.

The new enzyme, for which the name chymo-trypsin is suggested, was obtained by the action of minute amounts of the well-known pancreatic enzyme, trypsin, on crystals of a protein substance which Drs. Kunitz and Northrop obtained from fresh pancreas tissues. The newly-found protein they call chymo-trypsinogen.

The new enzyme, chymo-trypsin, is quite distinct from trypsin and except in its power to clot milk, its digestive activity is much less than that of trypsin.

The significance of the discovery lies in the fact that it gives new knowledge of how pancreatic enzymes or ferments become active, a matter that has never been agreed upon by scientists. It has long been known that these enzymes are not active in fresh pancreas or in freshly secreted pancreatic juice. They are activated by the action of a ferment from another part of the digestive tract. Since the new enzyme was obtained from apparently pure protein material, it seems to Drs. Kunitz and Northrop that the protein-digesting action of this and perhaps also of the other pancreatic enzymes is a property of the protein molecule.

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ENGINEERING

Unemployed Engineers Begin Aerial Mapping

PUTTING a large number of unemployed engineers and assistants quickly to work on an aerial mapping project that promises to be highly valuable to many Governmental agencies—this is the goal of a new Civil Works Administration Program.

Airplanes will soon be flying over selected agricultural agencies in ten southern states, while cameras take overhead views of farms and fields. On the ground below, groups of workers will chain off individual properties and plot to scale the results shown on the air pictures. Fitted together, the air photographs will then form a great mosaic picture map of the land.

During 70 days an allotment of \$650,000 is to be expended for this purpose. Mapping of 40,000 square miles will proceed as far as possible, with 500 engineers and some 1,500 assistants taking part. The states engaging in the project are Alabama, Arizona, Arkansas, California, Georgia, Louisiana, Mississippi, New Mexico, South Carolina, Texas and the District of Columbia.

The U. S. Geological Survey has charge of the project. Advising and conferring with the Survey are representatives from Governmental agencies which expect to find the maps useful. These include the Bureau of Census, Agricultural Adjustment Administration, Coast and Geodetic Survey, Corps of Engineers of the U. S. Army, and the Army Air Corps. It is believed that many additional uses for the maps will occur, once they become permanent Government records.

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ENDOCRINOLOGY

Opposite Sex Effects From Pituitary Hormones

FROM the pituitary gland located at the base of the brain come two hormones which produce opposite effects on the sex glands of mature fowls, it appears from the report of Drs. Oscar Riddle and his associates, Ernest L. Lahr and Dr. Robert W. Bates, of the Carnegie Institution of Washington.

One of these hormones has for some time been known to cause rapid and premature growth in the sex glands of young animals. Dr. Riddle and associates have now found that small amounts of this same hormone cause enlargement of the ovaries of mature hens, also.

Another hormone of the many produced by the pituitary gland, the one which stimulates milk production in mammals, has the reverse effect on the ovaries of mature fowls, causing a marked decrease in their size. The same opposite effect of these two hormones was observed on the sex glands of adult doves, both male and female.

These observations reinforce other evidence previously obtained indicating that not one but two hormones of the anterior pituitary are concerned in regulating the size and activity of the sex glands and that their normal adult size can be increased or decreased by giving the appropriate hormone.

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BACTERIOLOGY

More Carotene Found In Bacteria Than in Carrots

New Method for Estimating Number of Living Bacteria; Acidophilus Milk Keeps Best Without Refrigeration

NEARLY twice as much carotene, the principal yellow pigment that gives carrots their color and from which animals produce vitamin A, is found in certain bacteria or "germs" as in carrots themselves, M. A. Ingraham and C. A. Baumann of the University of Wisconsin reported at the meeting of the Society of American Bacteriologists in Philadelphia.

These bacteria manufacture the carotene in their microscopic bodies. Production of carotene has always been associated with the presence of chlorophyll, green coloring matter of plants. Bacteria are on the borderline between the animal and plant worlds. Consequently it is interesting to observe, the Wisconsin bacteriologists pointed out, that while the bacteria are like animals in having no chlorophyll, they seem like plants in their ability to produce carotene.

Carotene is of importance because from this plant substance animals are able to produce vitamin A. No evidence was found for the presence of this vitamin in any of the bacterial extracts that contained carotene. However, rats

that were sick from lack of vitamin A recovered when fed bacterial cells containing carotene. The response of the rats could be entirely accounted for by the amount of carotene they received, the investigators stated.

Living and Dead Separated

A method of estimating the numbers of living and dead bacteria or "germs" growing in a tube or plate of artificial media, was reported by Dr. W. C. Frazier and A. J. Boyer of the U. S. Department of Agriculture.

Scientists have never before been able to make this distinction between living and dead bacteria in a culture, though many attempts at it have been made. If the method lives up to its present promise it is expected to have wide practical application.

When bacteria grow on artificial media, they form colonies. But scientists wishing to transfer some of these bacteria to another medium have at present no way of telling in advance which colony is made up of living bacteria capable of reproducing and carrying on the strain and which colony may be



DISCOVERY OF CITY AND SELF

Reconstruction of the Lost City and of men broken by joblessness goes on side by side. The picture shows one of the young CCC workers unearthing an ancient Indian pot. (Story on opposite page.)

largely made up of dead or dying bacteria.

The method consists of treating the bacteria, either as they are growing in cultures or after they have been smeared on slides for microscopic examination, with the sterilized filtrate from a growth of streptococci from milk. This treatment changes the way the dead bacteria react to certain stains and thus gives a means of estimating the numbers of living and dead bacteria in the culture.

Acidophilus milk, which is akin to buttermilk and prescribed for certain

digestive ailments, is better stored at the temperature of an ordinary room rather than in an ice box or refrigerator, it appears from studies reported by Drs. Lenore M. Kopeloff, John L. Etchells and Nicholas Kopeloff, of the Psychiatric Institute and Hospital, New York City.

The micro-organism which sours the milk and which is considered valuable in treatment of digestive disorders, survives much better when the milk is stored in the room than when stored in the ice box, the investigators found.

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ETHNOLOGY

Humans, Not Animals, Main Actors in Negro Folk-Lore

WIDESPREAD interest in Uncle Remus' stories about Br'er Fox and Br'er Rabbit has given animal personalities more prominence than they deserve in Negro folk-lore, Dr. Melville Herskovits of Northwestern University told the American Folk-Lore Society meeting at Columbus, Ohio.

Animal tales are essentially an educational device among Negro people, he has found, from his studies of Dahomean folk-tales from West Africa and tales from Dutch Guiana. Collections of stories obtained by Dr. Herskovits in these countries reveal more stories about human beings than about animals. Some of the most important cycles in African folk-lore deal with human characters.

The Cinderella type of story is often found, he reported. Stories about orphans, told with the moral that a child who has lost its mother must not be mistreated, are widely spread through African folk-lore.

Extensively told, too, are historical tales dealing with the adventures, often supernatural, of important persons in the history of a given people.

"The animal tales, essentially educational, are told to children," Dr. Herskovits explained. "Children also repeat them in story-telling contests that delight the young people in Africa and the West Indies. Whether or not such story-telling evenings, where each child demonstrates how many tales he knows, occur in the United States is not known.

"Older people in West Africa and Dutch Guiana, at least, do not tell stories of this kind. Among them, story-

telling has the purpose of keeping alive the mythology and history of the people, or to amuse the dead at funeral wakes.

"It would seem therefore that a re-evaluation of the incidence and significance of tales other than animal stories in collections of Negro folk-lore already made should be undertaken. New collections of tales among Negroes of the United States may well reveal many more stories of non-animal types than have been published."

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NAVIGATION

Polarized Light Aids Observations At Sea

SEXTANTS and binoculars used by the Navy and on ships at sea can be improved for observations under certain light conditions by attaching to them polarizing prisms, Dr. E. O. Hulburt of the Naval Research Laboratory, told the American Physical Society.

Such a device admits light that vibrates in only one direction. It has long been known, Dr. Hulburt said, that the light of the sea and of the sky is a mixture of plane polarized and unpolarized light. He found that a polarizing prism properly oriented would darken the sea relative to the sky, reduce the brilliance of the sun path and render the horizon more distinct. In bright weather it increased the visibility of objects against the sea background. This is expected to make observations at sea more accurate.

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BIOLOGY

Poisonous Plant Explains Mysterious Bee Disease

LOCO WEED, prime trouble-maker to Western horses and cattle, is poisonous to much smaller animals as well, according to a report presented before entomologists at the meeting of the American Association for the Advancement of Science in Boston. G. H. Vansell and W. G. Watkins, of the U. S. Bureau of Entomology working at Davis, Calif., told how they have found dead and dying bees in and near the flowers of the spotted loco, one of the more abundant and poisonous species of the weed in certain parts of Nevada.

Before the death of the bees was traced to this poisonous plant, it was blamed on a new and mysterious disease, which discouraged many of the Nevada bee-keepers and caused others to move their apiaries out of the region.

Loco poisoning of bees, Messrs. Vansell and Watkins found, is most common after the first cutting of the alfalfa crop and before the second growth of this principal honey plant produced a new crop of flowers, especially if sweet clover is scarce and the loco weed plentiful. Sometimes weather conditions cause a scarcity in the loco weed, after which the bees do not die off so rapidly.

Not all the bee-keepers' troubles can be traced to the loco, however, the two investigators warned. Bee-keeping, like any other branch of agriculture, is governed by a whole complex of factors, and it is not safe to assign any given effect to one single cause.

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IS OUR CLIMATE BECOMING Milder?

an address by

J. B. Kincer

Chief, Division of Climate and Crop Weather of the U. S. Weather Bureau

Wednesday, January 3, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.



EUROPEAN-AMERICAN

This animal at the Leningrad Zoological Garden is a hybrid of European bison, or wisent, and American bison.

PHYSICS—PHYSIOLOGY

X-Ray Pictures Show How Opera Singer Produces Tones

X-RAY PICTURES of the throat of Madame Lucrezia Bori, famous soprano of the Metropolitan Opera Company, have given scientists new knowledge of the cause of differences in voice quality, it appears from a study conducted by G. Oscar Russell of Ohio State University and reported by the Carnegie Institution of Washington.

The X-ray photographs were made with synchronized sound record accompaniment while Mme. Bori sang an aria covering a wide range of pitches, voice qualities and vowels. She was even prevailed upon to produce one bad, strident, tight tone, so that the scientists would have a record of the way the vocal organs act in bad singing as well as in good.

The pictures were made with X-ray apparatus especially devised so as to avoid any impediment to the artist's ease and freedom in singing, thus insuring the production of her natural tones. The exposure time of the X-ray plate was reduced to 1/120 of a second, so as to make it unnecessary for the artist to sing stultified, long notes merely to get a sufficient exposure.

The study showed, among other things, that in the case of this one famous voice, at least, the soft palate

opening into the nasal passages remains closed under practically all circumstances. Nasal resonance is not made use of except for the relatively small amount of sound energy which could be transmitted through the walls themselves.

The X-rays of Mme. Bori also showed that the larynx does not necessarily always rise on all high pitches and fall on low pitches. Furthermore, the larynx does not remain constantly anchored to the spinal column by the powerful constrictor muscles but shifts its position quite constantly. The purpose of such shifts has not yet been discovered.

The study showed that the pharynx is usually distended on the vowel "i" regardless of pitch, and that the epiglottis or areas in the neighborhood of its tip regularly constrict, or in other words the back of the tongue regularly "gets into the throat" in order to produce a clear vowel "a" (ah).

When Mme. Bori produced the one bad tight tone, the pharyngeal cavity was more distended than usual but the interior larynx was obviously very constricted.

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Papier-maché can now be produced from cornstalks.

ZOOLOGY

Bison Blood Being Bred Out of Wisent Hybrids

EFFORTS are being made to build up a supplementary herd of wisent, or European bison, almost exterminated as a result of the World War, by an interesting technique called *Verdrängungszucht*, or "suppression breeding." Surplus wisent bulls have been bred to American bison cows. Only female calves are kept, and these are bred back to wisent sires, each generation thus getting rid of half the remaining bison blood, until finally a stock of practically pure wisent will remain. This experiment is being carried on at the reserve at Springe, in Germany, but it is expected that the herd will soon be transferred to roomier pastures in Brandenburg.

In the meantime, the stock of pure-blooded wisent is being kept carefully separated from the cross-breeds. Every effort is being made to increase the number of these interesting animals. If both breeding programs are successful, there will eventually be two distinct groups of wisent in Germany: the pure-bred European stock, and a stock of mixed ancestry with a minimum of American bison blood surviving in it.

The State of Prussia has recently purchased three pure-blood wisent cows and one pure-blooded bull from the estate of the late Count Arnim-Boitzenburg. These will be added to the herd already in possession of Prussia.

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ASTRONOMY

Aluminum Captures Invisible Starlight

THE usual mirrors for stars that astronomers use in their reflecting telescopes consist of glass coated with silver. While these conventional stellar looking-glasses have allowed an astounding exploration of the heavens, they are "blind" to extreme ultraviolet radiation beyond 3300 Angstrom units in the spectrum, a point that is about as far beyond the visible violet as violet is beyond the blue light of the rainbow.

With the idea of reflecting this extreme ultraviolet to as short a wavelength of light as can get to earth through the ozone of the stratosphere, there have been made at Cornell University mirror coatings of chromium and aluminum. These metals reflect the ex-

tremely short ultraviolet radiation, which is beyond the limit of reflectivity of silver. At the suggestion of Prof. S. L. Boothroyd of Cornell, two graduate students in physics, Robley Williams and George Sabine developed a German method of depositing metal film on glass and applied it to the coating of astronomical mirrors.

Last year a 10-inch mirror was chromium coated and used at Cornell's Fuertes Observatory to photograph the star Vega's spectrum in the extreme ultraviolet, in which region silver just allows the radiation to pass through without reflecting it.

This year Lowell Observatory loaned a 15-inch mirror and a 4-inch secondary which were coated with aluminum and a Cornell party used them and other aluminum-coated mirrors and quartz spectrographs at Lowell Observatory, Flagstaff, Ariz., to photograph nearly 200 extreme ultraviolet spectra of over 80 typical stars. The Cornell party, which consisted of Prof. and Mrs. S. L. Boothroyd, Mr. and Mrs. H. C. Ketcham, R. W. Shaw, Robley C. Williams and George B. Sabine, worked during September and October at Lowell Observatory's mountain station at 11,500 feet altitude as well as at Lowell Observatory, at 7,350 feet altitude.

Analysis of the spectrograms obtained, now in progress, is expected to give new information about the temperature and condition of the star.

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GEOLOGY

Crack in Earth Indicated By Radioactive Water

RADIOACTIVE water, captured by geologists in wells dug by farmers in Michigan, disclosed the existence of a fault, or crack in the earth's deepest rocks, although it was masked by a thick overlying layer of earth. At the meeting of the American Association for the Advancement of Science, Prof. Alfred C. Lane and Dr. W. R. Bennett, of Tufts College, told how it was done.

Water samples, collected and rushed to Purdue University for analysis, showed varying degrees of radioactivity; the closer to the fault the wells, the more active the waters. This was because radioactive substances from deeper within the earth's crust were rising through the crack and charging the water.

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MECHANICS

Scientists and Housewives Test Bottle-Top Unscrewing

EVER TRY to screw off a bottle top that refused to be unscrewed?

If so, you will sympathize heartily with a piece of research at the Pittsburgh Testing Laboratories. Calling on housewives with varying degrees of muscle to aid in the test, the laboratory has gone very thoroughly into the question of just how much strength manufacturers can expect the customers to exert on a bottle top.

"The twisting effort that a woman can exert in unscrewing a cap is strictly limited," reports the laboratory director, M. L. Carr, in the trade journal *Food Industries*.

The weakest-armed woman exerted a twisting force of only 11.6 inch-pounds, while the strong arm of the strongest woman twisted with a force of 29.6. The average housewife naturally came well between these extremes with a power of 18.5 inch-pounds.

One jar of sandwich spread which proved immovable—even when the housewife gave up twisting it and took to hitting, prying, and heating the bottle—was given a laboratory test. Screwing it off required 102 inch-pounds of twisting effort.

The actual test consisted of taking ten different unopened bottles and jars of grocery goods into the housewife's own kitchen and asking her to open each by unscrewing the lid. If she failed, she was told to go ahead and open it any way she liked, and the laboratory found this meant anything from banging the bottle on the floor to calling in a husband. Incidentally, some jars baffled even the husband. The experiment was repeated in fifty kitchens, with 500 bottles and jars altogether put to the kitchen test.

Out of the test emerges the information that the way in which a cap is applied to a bottle in the factory may be one important factor in the opening process. Some caps are "rolled on." That is, the threads are rolled into the cap over the threads of the container. Other caps are "preformed." These caps have their screw threads formed separately from the container, but designed to fit the container threads.

Of the 96 bottles and jars that proved

unscrewable in the hands of the housewives, 56 were removed by some rough-and-ready device, and the remaining 40 defied all efforts. Of these 40 only two were rolled-on screw caps, says Mr. Carr's report, whereas the other 38 were preformed caps.

The plight of the weakest women who have to tackle the bottle cap problem is pronounced indeed sad. About half of the bottle caps are beyond their strength. But when even the powerful Katrinkas give up the struggle with a bottle, manufacturers may well pause to take thought on the bottle-top question.

Science News Letter, December 30, 1933

MEDICINE

Immunity to Disease Measured in Tissue

WHEN an animal is given immunity to disease germs, its skin and other tissues acquire protective properties as well as the blood, in the opinion of Prof. Reuben L. Kahn of the University of Michigan.

At the meeting of the American Association for the Advancement of Science Prof. Kahn reported a method of measuring the degree of immunity acquired by the different tissues of the body. He pointed out that if it is possible in this way to learn the extent of immunity of all the tissues of an animal, medical scientists will be able to fight germ diseases more successfully than at present.

Prof. Kahn's studies showed that when an animal is immunized its body tissues acquire a new property; namely, the capacity to detect and to anchor or combine with the immunizing substance whenever they come in contact with it.

The protective nature of this tissue change is evident, since by combining with the substance against which the animal is immune, the tissues prevent its diffusion or spread throughout the body. In the case of infections, this capacity of the tissues may determine whether the germs will spread throughout the body and produce widespread

injury or will be localized in the tissue wherein they have gained entrance.

The skin, Prof. Kahn found, possesses a combining power for the immunizing substance more than ten times greater than muscle tissue, brain tissue or blood. Since this combining power is a defensive response, it must be assumed that the degree of immunity of the skin is far greater than that of the other tissues studied.

This is perhaps to be expected, Prof. Kahn observed, since the skin, throughout the ages, has been the most exposed to attack by bacteria, making a particularly strong defensive mechanism necessary.

Science News Letter, December 30, 1933

CHEMISTRY

"Diplogen" Suggested As Heavy Hydrogen Name

AERICAN and British scientists do not agree as to what to name science's new baby, the double-weight hydrogen atom, discovered in America.

Lord Rutherford, in a Royal Society discussion upon heavy hydrogen, urged the adoption of "diplogen" as the name of the double weight hydrogen atom and "diplon" as the name of the nucleus or kernel of heavy hydrogen.

Prof. H. C. Urey of Columbia University, one of the group of American scientists who discovered heavy hydrogen, had already christened the atom "deuterium," and at the University of California the nucleus had been labeled "deuton."

The principal objection to the American terms lies in the phonetic similarity between deuton and neutron. Neutron is the uncharged or neutral particle of nearly the same weight as a proton or ordinary hydrogen nucleus.

If the scientists discussing these atomic particles have colds or do not speak distinctly, deuton and neutron are easily confused in speech, Lord Rutherford said.

Dr. Frederick Soddy, the Oxford chemistry Nobel, who pioneered in investigations on varieties of elements and coined the word "isotope" protested against the idea that ordinary mass one hydrogen and the heavy weight hydrogen of mass two are really isotopes. He considers hydrogen and deuterium (diplogen) homologues like oxygen and ozone rather than true isotopes.

Science News Letter, December 30, 1933

ARCHAEOLOGY

Hidden Temple Found Within Mayan "Castle"

A BEAUTIFUL temple hidden within a temple has just been discovered by Mexican government archaeologists at the old Mayan city of Chichen Itza. The hidden temple is in the lofty Castillo or so-called "Castle", a temple to the Feathered Serpent god, perched on the highest pyramid base in the city.

Aware of the ancient Indian trick of building new structures over old, to honor the gods or to mark the passing of periods of time, no one knows exactly why, the excavators began a year ago to probe into the interior of the gigantic substructure of the Castle.

At first they encountered only walls of a smaller inner pyramid. Later they found a human sepulcher. The burial was accompanied by funeral offerings of turquoise mosaics, thousands of turquoise beads, and exquisitely carved fine jades.

This year they followed the sloping walls of the hidden pyramid upwards, and came upon a stone shrine on the flat summit. The building thus discovered is almost perfectly preserved. The early pyramid and temple had not been destroyed, but merely heaped over with earth and rock to form a larger base for the present shrine of the Feathered Serpent. The roof of the buried temple is flush with the flat summit of the present temple, and forms the floor of the adulatory.

While the theme of designs of the exterior temple consists of plumed serpents and warriors, the most import-

ant decorations of the older shrine are tigers. The tigers are sculptured in stone on the frieze above the door. The facade also has bands of geometrical designs, ornamental shields, and flower-like rosettes sculptured into the stone. These decorations are entirely different in style from those of the present outer temple.

Science News Letter, December 30, 1933

PHYSICS

Raman Effect Found Different in Heavy Water

HEAVERY water takes light of one color and changes it to light of slightly different color in a way not the same as this Raman effect in ordinary water, Dr. R. W. Wood of Johns Hopkins University has demonstrated.

In communications to *Nature* and *Science*, Dr. Wood reports that water containing the recently discovered hydrogen isotope of mass two, when lighted with ultraviolet light of 2536 Angstrom units from a mercury vacuum tube, changes part of it to longer wavelengths that average 2711 Angstrom units.

This is a new proof of the optical effect discovered in 1928 by Sir Chandrasekhara Venkata Raman, Hindu scientist who was awarded the Nobel prize in physics for 1930. Dr. Wood was the first to verify the Raman effect outside of Raman's own laboratory.

The new Raman band discovered by Dr. Wood agrees within 4 per cent. with the expected value derived from theoretical calculations. The band observed is due to water molecules that have one atom of heavy hydrogen and

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one atom of ordinary hydrogen in their familiar H two O composition. Dr. Wood also obtained a slight indication of a light band due to water molecules in which both atoms consisted of heavy hydrogen.

This discovery of the Raman effect of heavy water is additional evidence that heavy hydrogen is so different chemically and physically that it can almost be considered a new element.

Dr. Wood used 18 per cent. heavy water prepared electrolytically by Dr. John W. Murray of the Johns Hopkins chemistry department.

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ENGINEERING

New Pipe Line to Bring More Water to Los Angeles

See Front Cover

MORE water for Los Angeles is the purpose of the big steel serpent which the front cover of this week's SCIENCE NEWS LETTER strikingly pictures climbing a mountain. This project, an achievement of electric welding, is conquering canyon and straddling mountain to join Boquet Canyon Reservoir and Owens Valley Aqueduct with a four and one-half mile long, arc welded pipe line.

The diameter of the pipe varies from six feet eight inches to seven feet ten inches, the smaller diameters being used where pressures are highest. The six-foot-eight-inch pipe is more than an inch thick.

An idea of the size of the job is gained when one learns that 450 pounds of metal must be melted into each joint in order to seal it.

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SUBSCRIBERS in foreign countries PLEASE TAKE NOTICE!

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ETHNOLOGY

Marco Polo Tales Become Fact Through Research Into History

HAVE YOU a drab mental picture of medieval China? A bird's-eye view of a vast, unwieldy and altogether backward mass of people; wise, yes, but with an antiquated wisdom?

If so, take a look at the lively, progressive China that Marco Polo tried to tell the world about when he came back to Europe in 1296, after seventeen years at the court of the Great Khan.

The world enjoyed Marco's reports of Chinese marvels. But take him seriously? Well, it was hard to tell where truth left off and a good imagination began. Marco's travels came to a place of doubtful honor beside the works of Baron Münchhausen and the Thousand and One Nights.

But critical studies of what Marco Polo reported and careful checking against known facts are giving the Venetian traveler a reputation for being a keen and intelligent observer.

Praised as Traveler

Lauding Marco as "the medieval Herodotus, the greatest traveler of the Middle Ages, and one of the greatest of all time," Dr. E. W. Gudger of the American Museum of Natural History sums up in the *Scientific Monthly* some of the medieval Chinese discoveries and customs that Marco reported and that we moderns have lately re-discovered.

"I can remember," writes Dr. Gud-

ger, "when four-masted schooners were new and so extraordinary that people went miles to see them."

But Marco Polo told of Chinese preparations for a voyage, and described thirteen ships, each of which had four masts and often spread twelve sails.

Making water-tight compartments is an ultra-modern device of ship building. But Marco tells carefully how the Chinese did it for their fifteenth century ships.

Taxicabs of Old China

The Chinese anticipated recent German experiments with paper clothing. They had fine summer clothing, said Marco, made of cloth from the inner bark of certain suitable trees.

Taxicabs thronged the streets of medieval Chinese cities. Marco described an infinite succession of these public carriages which seated six persons and were in constant request for ladies and gentlemen going on parties of pleasure.

Surely the individual drinking cup appeared after germs were discovered? But no, the Chinese had them. In the province of Maabar, Marco was impressed by seeing every man drinking from his own vessel, and nobody else's, and if a stranger lacked a cup, they would pour the drink into his cupped hands.

Spitting Taboo

Careless spitting was taboo. The nobles carried handsome little sputum cups. And as for coughing and sneezing precautions, those who waited upon the Great Khan at the table muffled their mouths and noses with fine napkins so that their breath might not taint dish or goblet.

Hybrid animals, paper money, fire alarms, gold teeth, and many another modern-sounding idea were gathered by Dr. Gudger from the latest comprehensive and scholarly editions of the now respected tales of Marco Polo. Both Marco and medieval China are getting a new deal, with greater world respect and prestige.

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NATURE RAMBLINGS

by Frank Thone

BOTANY



Geraniums

AS WINTER takes solid hold upon the land, and there is less and less to see in the woods, we begin to take refuge and consolation in potted plants indoors. For man is, by some old memory, a creature of semi-tropical woodlands and never feels at home in the temporary Arctic he has to endure every year in high latitudes. So he builds little bowers to keep his soul alive until spring.

Of all potted plants, the red geranium is the staple, the standby, the one thing that a housewife will have if she lacks all other houseplants. It is handed down from mother to daughter through generations, it is passed along from neighbor to neighbor through whole streets, it is multiplied into dozens by "slips" stuck into a bottle of water.

The geranium is well adapted to the hard life a potted plant has to live in the average house or apartment. It has to get along with intermittent waterings and yet keep its water-supported life going in an atmosphere almost as dry as the Sahara. It can do this because it is a plant of semi-arid habitat to begin with. It has a thick, succulent stem that serves as a water reservoir, and can keep the plant alive even if drought causes the leaves to wither and drop off. And its vitality is so high that even after a drought of this kind it will break crazily into bloom as soon as you give it a cupful of water.

Cheap if you like, plebeian if you choose to call it so, the red geranium has its own good place in the world and fills it praiseworthily and well.

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Lavender oil distilled by steam is said to have exceptional aromatic qualities.

HEREDITY

Poisons Produce Hereditary Changes in Sex Cells

WHEN the male of the white mouse is poisoned with alcohol or certain plant toxins, such as ricin, the sex cells are affected in a specific way. A true mutation, that is transmitted as a functional change in the animal's descendants, is caused. These observations have been reported by Dr. Agnes Bluhm of the Kaiser Wilhelm-Institut of Biology, Berlin, in *Forschungen und Fortschritte*.

The change shows itself in the children in the fact that there is a greater mortality in their litters.

If, however, the children of an alcoholized male are mated among themselves, the mortality rate is less in the grandchildren and may be restored to normal in the great grandchildren. This fact would seem to indicate that the alcohol had simply a harmful effect which was wiped out in two generations and had not produced a really hereditary characteristic.

Dr. Bluhm believes, however, that a distinct mutation is produced in the sex chromosomes of the male, which in interbreeding is obscured by the fact that in the fertilization of an egg by the affected sperm cell there is produced

in the egg an antagonistic substance, something after the manner of a toxin-antitoxin reaction.

This belief is based on the results of cross fertilization. When a male of the alcoholized strain is mated with a normal female the mortality in the young is always greater than when a female of the alcoholized strain is mated with a normal male.

When the male mouse was poisoned or immunized by gradually increasing doses of ricin his immediate progeny showed hypersensitivity to small doses of ricin. Like the alcohol effect this physiological reaction tended to disappear in the successive generations, but its existence in the male cell could be brought out by cross fertilization. That the effect was specific for the ricin and not simply a general weakening or injury was demonstrated by testing the progeny with other poisons, snake venom, for example, or abrin.

It has long been known from the work of Prof. H. J. Muller and others that radiation of the sex organs with X-rays will produce definite mutations which express themselves in structural features of the descendants. Dr. Bluhm's work indicates that chemical reagents may cause similar mutations which express themselves, however, in specific functional alterations in succeeding generations.

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MEDICINE

Tapeworm Eggs in Brain Cause So-Called Epilepsy

CONVINCING proof that many cases diagnosed as true epilepsy are actually cases of infestation with tapeworm larvae was presented to the Royal Society of Tropical Medicine, London, by Col. W. P. MacArthur, professor of tropical medicine at the Royal Army Medical College and consulting physician to the British Army.

The epileptic seizures are due to invasion of the brain by the eggs of the tapeworm, which form small, cyst-like masses called cysticerci, and particularly to the degeneration of these parasites after they have died, Col. MacArthur said. He has found as many as two hundred cysticerci in some brains.

Investigating the occurrence of epilepsy among soldiers, he found over sixty definite cases of infestation with

cysticerci. Twenty such cases have been diagnosed in hospitals during the current year. Six or eight soldiers recently invalidated from India and victims of cysticercosis had been certified as cases of "true epilepsy." These cases of cysticercosis, the medical name for the condition, have no symptoms to distinguish them from ordinary epilepsy.

Cases of cysticercosis had been wrongly diagnosed as acute mania, melancholia, delusional insanity, dementia, brain tumors, and the nervous disease, disseminated sclerosis.

Col. MacArthur believes that in England many persons in civil life who have been stigmatized as hereditarily insane are suffering from cysticercosis acquired during residence abroad.

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●First Glances at New Books

Philosophy—General Science

PHILOSOPHY OF SCIENCE—Philosophy of Science Association—*Williams & Wilkins*, 132 p., \$5 per year. Volume 1, Number 1 of a new quarterly, the organ of the newly organized Philosophy of Science Association. Dr. William M. Malisoff of Philadelphia is editor and the array of scientists upon the editorial and advisory boards is imposing. Says the explanatory editorial: "Philosophy of science is the organized expression of a growing intent among philosophers and scientists to clarify, perhaps unify, the programs, methods and results of the disciplines of philosophy and of science. The examination of fundamental concepts and presuppositions in the light of the positive results of science, systematic doubt of the positive results, and a thorough-going analysis and critique of logic and of language, are typical projects for this joint effort."

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Engineering

GENERAL ENGINEERING HANDBOOK—Charles Edward O'Rourke, Ed.-in-Chief—*McGraw-Hill*, 921 p., \$4. A surprising amount of civil, mechanical and electrical engineering information has been brought between the covers of one convenient-sized handbook. This volume does not pretend to supplant more complete handbooks, each devoted to a separate branch of engineering, but rather it rounds out the reference shelf of the specialist in one field by making data from other fields available to him in readily usable and understandable form.

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Botany

THE MEXICAN AND CENTRAL AMERICAN SPECIES OF VIBURNUM—C. V. Morton—*Govt. Print. Off.*, vi+33 p., 5c.

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Sociology

METHODS IN SOCIOLOGY—Charles A. Ellwood—*Duke Univ. Press*, 214 p., \$1.50. The author belongs to the school holding that the sociologist should be free to develop his own methodology and need not be confined to methods analogous to those employed by the natural sciences. In his introduction, Dr. Howard E. Jensen quotes the saying that "value may prove the key that will

eventually release all of the human sciences from their present position of pathetic, if dignified, futility." "Such," he says, "at any rate, is the thesis of this book."

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Technology

THE ROMANCE OF PAPER—Warren B. Bullock—*Richard G. Badger*, 88 p., \$2. This is a delightfully informative little book which describes non-technically and without neglect to the history of paper making the many different kinds of papers, their uses and how and where they are made.

Science News Letter, December 30, 1933

Psychology

A SURVEY OF THE SCIENCE OF PSYCHOLOGY—J. R. Kantor — *Principia Press*, 564 p., \$3.75. A textbook for college students written from the organismic or interactional viewpoint by a professor of psychology at Indiana University. The organismic psychologist disagrees with both mentalist and behaviorist. He regards the individual as the result of an interplay of forces between the organism and the environment.

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Exploration

THE CONQUEST OF THE ATLANTIC—Ingri and Edgar Parin d'Aulaire—*Viking*, 55 p., \$2.50. As a book for "any age after ten, or even before," this quarto volume is classically wrought both in respect to its 27 pages of superb illustrations, many of which are in color, and to the research preceding and care in the preparation of the text.

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Chemistry

SYNTHETIC ORGANIC CHEMISTRY IN INDUSTRY—George O. Curme, Jr.—*Columbia Univ. Press*, 29 p., 50c.

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Education

SELECTION AND APPOINTMENT OF TEACHERS—W. S. Deffenbaugh and William H. Zeigel—*U. S. Govt. Print. Off.*, 115 p., 10c. Monograph No. 12 of the National Survey of Secondary Education.

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Astronomy

GLORIOUS STARS—M. E. Rixson—*Putnam*, 80 p., 2 folded charts, \$1. An excellent judicious blend of brief astronomical information, mythological background and literary allusions, with plenty of diagrammatic constellation charts. A really astonishing amount of popular astronomy to get into so few pages.

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Botany

SPRING WILD FLOWERS OF THE OPEN FIELD—Gayle Pickwell, editor—*Suttonhouse (Los Angeles)*, x+156 p., \$2.50. Anybody who has ever walked the California mesas and foothill meadows at that magical turn of the seasons, about Easter, when the rains have ceased and the sun has not yet become a tyrant, can understand the legend of Proserpine; for southern California and the Greek peninsula are ecologically much alike. This addition to the already extensive California floral literature will charm you whether you are a botanist or a classicist.

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Standards

1933 BOOK OF A. S. T. M. STANDARDS: PART I, METALS; PART II, NON-METALLIC MATERIALS—*American Society for Testing Materials*, Part I 1002 p., Part II 1298 p., cloth \$14 or \$7.50 each part, half leather \$17 or \$9 each part.

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Education

THE REORGANIZATION OF SECONDARY EDUCATION—Francis T. Spaulding, O. I. Frederick and Leonard V. Koos—*U. S. Govt. Print. Off.*, 423 p., 40c. One of the larger monographs (No. 5) of the National Survey of Secondary Education.

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Paleontology

A POPULAR GUIDE TO THE NATURE AND THE ENVIRONMENT OF THE FOSSIL VERTEBRATES OF NEW YORK—Roy L. Moodie—*Univ. of the State of New York*, 122 p., 45c.

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